

The Red-Cell Sedimentation Rate of the Blood in Rheumatism and Arthritis

By J. A. SMYTH, M.D., B.SC., D.P.H.,
from the Royal Victoria Hospital, Belfast

HISTORICAL.

IF the coagulation of blood be prevented, the red cells will sediment, at first rapidly and then more slowly, finally forming a semi-fluid deposit overlaid by clear plasma. Under standard conditions, the rate at which this sedimentation takes place in the blood obtained from normal healthy subjects is surprisingly constant. It is, however, markedly altered by the presence of certain diseases.

These facts were originally noted by Biernacki about the year 1893, but no particular attention was paid to them until about twenty-five years later, when their importance in general medicine was pointed out by Fähræus, and then Westergren.

GENERAL.

The rate at which sedimentation of the red cells takes place seems to depend on the percentages of globulin and fibrinogen, and to a lesser extent lipoids, in the plasma. It is increased by processes giving rise to protein disintegration, in inflammatory and, above all, exudative processes—for example, infectious fevers, exudative pulmonary tuberculosis, acute and chronic arthritis—pregnancy, cancer, and nephrosis. Even slight infection of an acute type increases the rate, and in considering its significance in any particular case, care must be taken to rule out the possibility of even a cold or sore throat. Fähræus has found that the rate is increased in obesity: in surgical tuberculosis and chronic bone infection, such as osteomyelitis, there is generally a moderate increase: following a hæmorrhage high figures are often obtained. The rate is not affected by food or menstruation, nor do chronic conditions such as simple affections of the stomach and intestines, nervous and endocrine diseases, alter it.

METHOD.

The study of the subject was, and still is, greatly hindered by the variety of techniques used and the consequent difficulty, or impossibility, of comparison of different series of results. One of the most satisfactory is that used by Westergren. For the test he uses blood to which a quarter of its volume of 3.7 per cent. sodium citrate has been added as an anti-coagulant. This strength of citrate is isotonic, producing no laking of the red cells, and the amount is sufficient to combine with all the calcium present in the proportion of blood. The mixture is drawn up into a tube 2.5 mm. in internal diameter and 300 mm. in length, the lower two-thirds of which is graduated in mm. reading from above down. When the upper surface of the blood-citrate mixture has been brought to the zero mark, the tube is held in a

vertical position, the lower opening being sealed by pressing the point down on a rubber surface. The height of the clear supernatant column left by the sedimentation of the red cells is read at one, two, and twenty-four hours.

The test must be carried out immediately on the blood being taken, otherwise the rate of sedimentation may be markedly diminished.

NORMAL FIGURES.

In a series of observations, Forestier found that the figures given by normal people were as follows :—

	<i>Men.</i>	<i>Women and Children.</i>
1 hour	3—5 mm.	6—8 mm.
2 hours	10—12 mm.	12—15 mm.
24 hours	30—50 mm.	

Kahlmeter, working in Stockholm, allows up to 7 mm. for men and 11 mm. for women in the first hour as normal, and in my experience these are much nearer the figures generally found.

RHEUMATISM AND ARTHRITIS.

From the standpoint of sedimentation rates, it is convenient to divide the mass of conditions coming under the wide terms of rheumatism and arthritis into rough groups as follows :—

- (a) *Acute*:
 1. Acute rheumatism.
 2. Acute infective arthritis (gonococcal, staphylococcal, etc.).
- (b) *Chronic*:
 1. Neuritis and fibrocytosis.
 2. Chronic osteo-arthritis.
 3. Chronic rheumatoid arthritis (atrophic).

In acute rheumatism and acute infective arthritis the figures are usually very high, often 100 mm. or over for the first hour. As recovery takes place the rate rapidly falls, but there is generally some lag behind the clinical improvement. Recovery in acute rheumatism should not be assumed, or physiotherapy commenced, until the figures for the test are normal, otherwise relapses are liable to occur.

Neuritis and fibrocytosis—sciatica, lumbago, etc.—generally produce no change. Coste and Forestier found only twenty-two per cent. give figures greater than 10 mm. in the first hour, and of these none exceeded 20. If a case of this kind show a rate of over 30 mm., the possibility of some other diagnosis being the correct one should be carefully considered.

Chronic osteo-arthritis has long been regarded as one of the most difficult conditions to treat with any degree of success. It appears to be largely degenerative in nature, and it usually attacks one or two of the large joints of an aged subject. Lipping of the joint surfaces and osteophytes are sometimes present. Many regard the process as absolutely non-infective, and this view is borne out by sedimentation-rate determinations on sufferers from the disease. Kahlmeter states that the figure is invariably normal. Forestier found that sixty-two per cent. were under 10 mm.,

while a further thirty per cent. lay between 10 and 20 mm. Oppel, Myers, and Keefer of Harvard, using a different technique, agree with Forestier, and are of opinion that there are many exceptions to the general rule. They did not, however, obtain a very high figure in any case of the condition.

Next to pulmonary tuberculosis it is in chronic rheumatoid arthritis that the red-cell sedimentation rate is of greatest interest. In an active phase of the disease the figures are generally fairly high—50 or 60 mm. in the first hour and always over 20 mm. The values run fairly well parallel with the course of the disease, increasing when it becomes more active and falling with quiescence. Thus, by observing the curve, the progress of the disease may be observed and the effect of different treatments evaluated. The curve of the sedimentation rate in a case of rheumatoid arthritis may be as interesting to follow as that of the sigma-reading in syphilis or of the blood urea in azotæmic nephritis. Wendell, Stainsby, and Nicholls found that the increase in sedimentation rate ran very closely parallel to the degree of joint involvement, and in an analysis of almost six hundred cases concluded that it is "a reliable criterion of the activity, or severity, of the arthritic process at the time of testing."

Rheumatoid arthritis has received more than its share of ill-conceived treatments, and it may be that the sedimentation rate will provide an easy means of correctly estimating the value of such procedures.

Following the enthusiastic reports of Forestier on the results obtained by the injection of gold salts, there has been a great vogue for this method. Some years must elapse before any considered opinion can be given, but it would seem that the treatment may be of value in many cases. Forestier is of opinion that it is not likely to be beneficial if the sedimentation rate be not increased, and checks the results of treatment by systematic determinations, altering the exact salt used if no decrease be produced. It is useful to have some means of selecting suitable cases, in view of the tedious and slightly expensive nature of the treatment. In the same way the effect of vaccine treatment may also be determined. Vaccine and gold salt therapy may often be combined with advantage, noticeable clinical improvement often taking place, even in severe cases, accompanied by a diminution in the sedimentation rate.

REVIEW

THE NEW ART OF LOVE. By G. R. Scott, F.Ph.S., F.Z.S. London: John Bale, Sons & Danielsson. 1934. pp. 114. Price 3s. 6d. net.

RECENT years have seen the publication of numerous books pertaining to sex, many of which had better never been written. Others have, perhaps, been of service when written by experienced medical practitioners. "The New Art of Love" has been written by a layman, and thus lacks the essential background of medical knowledge, and as a result is composed of little else except vague generalities of human sex life. It attempts to discuss such subjects as Marriage, the Choice of a Partner, the Honeymoon, Intercourse, Birth Control, Impotence, etc., in a manner suitable for lay readers, but whether anyone, even the most ignorant, would derive any benefit from its perusal is a matter of great doubt. Sir Arbuthnot Lane has written a foreword to it of twelve short lines, in which he says he has read the book "with very great interest and pleasure."